**Unit Syllabus – Probability**

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**Summary of Unit**

During this unit the class will be looking at the probability distribution and expected value. There will be an emphasis on how the two relate to each other. Some of the key things that students will learn is the definitions of random variable, expected value, and standard normal curve. Students will also know the parts of the probability distribution such as the mean, median, standard deviation, and standard error. Students will learn how to calculate the expected value and will calculate the probability of an event occurring. The students will look where the probability distribution shows up in students' everyday lives outside of the classroom. Most importantly the class will be looking at the way probability impacts decision making and how it can be used in problem solving. The unit will end by the students working in groups to create a presentation that sums up how probability impacts problem solving and decision making by using it in a real world example.

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**Establish Goals**

**Common Core State Standards**  
**Content Area**: Statistics and Probability  
**Grade Level**: High School  
**Domain**: Using Probability to Make Decisions  
**Cluster**: Calculate expected values and use them to solve problems  
**Standards**: 2. Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.  
4. Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.

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**Students will understand that…**

•probability is useful in problem solving and decision making.  
•the probability distribution is everywhere in real life.  
•the expected value is related to the probability distribution.

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**Essential Questions**

•Why is probability useful in problem solving and decision making?  
•How can the probability distribution be used in the real world?  
•How is expected value related to the probability distribution?

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**Students will know…**

•Definitions - probability, expected value, probability distribution, random variable, mean, median, standard deviation, standard error  
•Formulas - expected value formula, probability distribution formula, z-value formula for means, z-value formula for probability  
•Critical details - problem solving, decision making

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**Students will be able to…**

•describe the probability distribution.  
•evaluate the impact of their decision.  
•solve a problem using probability.  
•compare and contrast expected value and the probability distribution.  
•relate expected value to the probability distribution.  
•recognize where the probability distribution appears in their everyday lives outside of the classroom.

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**Performance Task Overview**   
Your state's fair has not been as successful the last few years as the fair planning committee expected. The committee is concerned that this may be due to weather. You are a statistician for the state as part of the state's data analysis team. The state is looking for a pair of statisticians to help solve this problem. Your job is to help the fair planning committee figure out when to hold the state fair. You and your partner from the state will look at temperature, humidity, wind speed, and precipitation to determine when the fair should be held. You will do this by looking at historic weather data. You will present your findings to the state's fair planning committee. Your boss expects all presentations from the office of statistics to use a Prezi with graphs created in GeoGebra. If you can convince them to hold the fair in the month that you find to be the best weather wise, then you will become part of the committee and will help plan this year's fair.

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**Expectations**

**Absences:**   
If you are absent, it is the student's responsibility to make up the assignments and/or tests when they return. All homework assignments are posted on my class website. This includes classes missed for field trips and sports events. It is the student's responsibility to come in at lunch or after school to catch up on missed work from their absences. You should get the notes that you missed from another student before meeting with me. If students are absent on the day of a test, they will be expected to make up the test on the next day that they are in school. There are exceptions for extended absences but the student must come see me the day they get back to school.

**Plagiarism:**   
Plagiarism is the practice of copying words, sentences, images, or ideas for use in written or oral assessments without giving proper credit to the source. Cheating is defined as the giving or receiving of illegal help on anything that has been determined by the teacher to be an individual effort. Both are considered serious offenses and will significantly affect your course grade. The school policy on plagiarism will be applied if the student is caught cheating or plagiarizing.

**Assignments:**   
Tests, quizzes, projects, and homework will make up your grade each marking period. Each test, and quiz as well as some homework assignments will be worth a certain number of points. All tests and quizzes will be announced well in advance to allow ample studying time. There will be some class time allowed for working on projects.

**Classroom Expectations**:   
Students are expected to be on time to class each day, when the bell rings, I expect each of you to be in your seat, and come to class prepared and ready to work. Being prepared for class means you should have your textbook, notebook, calculator, and pen or pencil. Students are expected to respect their classmates and teacher and be responsible for their actions. If you must leave the room during class (bathroom, locker, etc.), please quietly get up and do so. You do not need to ask for permission. If an individual abuses this privilege, I will take it away from him/her. Extra help is always available, all you have to do it ask me and I will be more than willing to set up a time to meet with you.

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**Benchmarks (300 points)**

**GeoGebra:** Students will use GeoGebra to draw the probability distribution by plotting points and drawing lines in between the points. Students will label the mean, median, mode, standard deviation, and expected value of the probability distribution by plotting each part as points and labeling them as such. Students must show their work on how they got their values. **20 points**

**Comic:** Students will create a comic to show their understanding of how probability can help them figure out the impact of a decision. In the comic students will create their own character. The character will be faced with a difficult decision. In the comic the students will show the character using probability to figure out the best option. Students will then show the impact of the characters decision. **30 points**

**Google Docs:** Students will create their own "beefy" problem that can be solved using probability. They must also make an answer sheet for their problem. Students will share the problem they have created with their classmates and the teacher on Google Docs. Students will then look at the problems that their classmates have created and will solve them using probability. Students will email their answer sheets to the teacher. All the problems that students have created will be gone over in class with the student leading the rest of the class through the problem that they created to get the answer. **40 points**

**PostermyWall:** Students will work with a partner to make a poster using PostermyWall that explains what expected value is and what the probability distribution is. Students will compare and contrast the probability distribution and expected value on the poster. Students will be expected to have graphs and effects, such as pictures coming in at different times, on their poster. **10 points**

**Timeline:** Students will make a timeline of times when the probability distribution has showed up in their lives outside of the classroom. Students will be expected to explain how it showed up in that time. **10 points**

**Prezi:** Students will get data on one of their real life experiences from their timeline. They will then relate that experience to the probability distribution and expected value, as well as other key information from the lesson and unit. Students will share their Prezi with the class. The Prezi must include pictures and graphs. They will also talk about how having the information may have changed the decision they made. If it wouldn't have changed their decision they must explain why. **40 points**

**Performance Task** (see above) **150 points**

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**Grading Scale**

**A** (93 -100), **A-** (90 - 92), **B+** (87 - 89), **B** (83 - 86), **B-** (80 - 82), **C+**(77 - 79), **C** (73-76), **C-** (70 - 72), **D+**(67 - 69), **D** (63 - 66), **D-** (60 - 62), **F** (0 - 59).